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NASA - P-20

1992 TOWN MEETINGS

Toward A Shared Vision

National Aeronautics and
Space Administration
April 1992

1992 TOWN MEETINGS

Toward A Shared Vision

- North Carolina State University
- University of Hartford
- Indiana University–Purdue University at Indianapolis
- California State University–Dominguez Hills
- University of South Florida
- University of Washington

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A Message from the Administrator

In 1992, the National Aeronautics and Space Administration (NASA) began a top-to-bottom reassessment of the state of the Agency and its programs. In the spirit of continuous improvement, we sought to ensure that NASA was delivering the maximum possible return on the nation's annual investment in civil aeronautics and space research and development.

In the process of this review, we soon realized that we were losing sight of our customers. Since NASA is a public Agency, it seems clear that our ultimate customers are the citizens of the United States — the people who pay our way — so we decided to go on the road and talk to them.

In November and December 1992, we began a series of town meetings across the country to give the public a chance to react to the vision of NASA being defined by our employees. We also asked the people for their opinions on NASA and its programs, and where they think our priorities should lie for the future.

The meetings helped us reach out to individuals and companies not directly involved in major NASA contracting and to solicit ideas on how to accomplish our programs better, faster and cheaper, without compromising safety or quality. Before and after the meetings, we took the opportunity to meet with students and teachers at local elementary and secondary schools, and to talk with executives from local businesses, large and small.

We were unsure what to expect as we began, but public participation surpassed our most optimistic forecasts. At each city we visited, hundreds and hundreds of people of all ages and walks of life turned out to share their visions for NASA's future.

The encouraging news is that the people who attended care deeply about their aerospace program. We want and need a thriving NASA, they told us. We need a program that keeps our nation on the cutting edge of science and technology. And while they want a program that helps address

national economic needs, they also want NASA to benefit the entire world by expanding its horizons and fostering peace.

The sobering news is that we have a lot of work to do at NASA to meet these needs and desires. Everywhere we went, people were hungry for information about all of NASA's programs — science, technology, space transportation, aeronautics research, the Space Station, Mission to Planet Earth and plans for exploration of the Moon and Mars. In the future, we must invest more time and energy in public outreach, especially to the vast numbers of people unable or unwilling to attend our first town meetings. We also heard over and over again that students, teachers, and parents alike want NASA to provide more aerospace-related educational materials and activities. We must do whatever we can to reap the maximum educational benefits from our programs.

The following report summarizes the results of our first six town meetings, and it describes actions that we are taking or intend to take to address the comments and themes that we heard.

This report will be circulated among our employees and federal policy makers as a snapshot of opinions on how well NASA is meeting the expectations of the public. It also will be made available upon request to any interested citizen; those who attended the town meetings can help us determine if we listened accurately, while those who did not attend can find out a little bit about what they missed.

The information gathered through the town meetings already is being used to help shape a new NASA strategic plan and to refine the Agency's vision statement. And we are considering how we might continue this kind of public outreach in order to keep in better touch with our customers.

Many thanks to all of the people inside and outside of NASA who worked to make the town meetings possible. Special thanks to everyone who took the time to share their thoughts and dreams. They helped make the meetings not only a worthwhile endeavor, but also a resounding success.

Daniel S. Goldin

Introduction

An [illegible] tradition dating back t[illegible]tury, town meetings [illegible]al citizens with an [illegible]tun[illegible]influence public [illegible]ion-[illegible]. In both its past [illegible]the town meet[illegible]is a dem[illegible]on of the prin[illegible]ple of direc[illegible]acy.

With the goal of developing a shared vision for the future of NASA, the U.S. civil aeronautics and space agency conducted a series of town meetings across the country in November and December 1992. Specifically, we sought comment on the Agency's new vision statement and mission values, which were developed by the Agency's employees in an effort to redefine NASA's priorities and purpose for the 1990s and beyond.

In practice, the meetings constituted a sort of nationwide brainstorming session on how to make aeronautics and space research more relevant to peoples' daily lives.

The town meetings took place at the following sites, chosen primarily for their relative distance from major NASA facilities:

- ▶North Carolina State University, Raleigh, NC – November 9
- ▶University of Hartford, Hartford, CT – November 17
- ▶Indiana University-Purdue University at Indianapolis, Indianapolis, IN – November 20
- ▶California State University - Dominguez Hills, Carson, CA – December 3
- ▶University of South Florida, Tampa, FL – December 11
- ▶University of Washington, Seattle, WA – December 16

In an attempt to reach the broadest possible audience, NASA turned to a variety of local and national organizations for help in getting out the word about the meetings. The host universities and professional associations like the American Institute of Aeronautics and Astronautics

"As explorers, pioneers, and innovators, we will boldly expand the frontiers of air and space for the benefit of all."

Draft of the NASA Vision Statement November 1992

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contributed mailing lists and local publicity.

A special effort was made to solicit the participation of small and disadvantaged businesses and minorities, with assistance from organizations such as the Small Business Administration and the National Association for the Advancement of Colored People. Announcements also were published several times in each of the largest daily newspapers in the host city.

Participants represented a diverse mix.

More than 4,500 people attended the meetings, well above initial expectations. It was a diverse crowd, in age, gender, profession and interests. About 50 percent claimed affiliation with the aerospace community; 12 percent were university students, teachers, and researchers; and another 38 percent identified themselves simply as interested citizens. Many people who could not attend a meeting shared their thoughts by mail.

Most participants were unabashedly enthusiastic in their support for some aspect of NASA. A few were critical of aerospace spending in these tight fiscal times. But all were obviously people who care about the future of the United States and the world.

The media also turned out in force for the town meetings. At all six sites, the largest daily newspaper provided coverage. Network affiliates and local cable television stations covered several meetings, in addition to live coverage on NASA Select TV, the Agency's cable television station. This television coverage undoubtedly expanded the audience for these town meetings many times over.

To make the most of an excellent opportunity for public outreach, NASA sent its LASER Van and the Space Station exhibit on a tour to most of the six cities that hosted town meetings. Co-sponsored by NASA, industry, and state government, the LASER Van is a mobile teacher resource center stocked with science- and math-related space education materials. The the Space Station exhibit consists of mockups of the Space Station modules installed in two tractor trailers.

Displays on NASA's technology transfer activities and its small

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business programs were set up inside each of the buildings housing the meetings.

Each four-hour town meeting began at 2 p.m. with a welcome by an official from the host university. NASA Administrator Goldin then spoke for about 45 minutes, explaining the purpose of the town meetings and NASA's desire to become more in tune with the needs of the public.

Several factors have combined to place NASA at a critical juncture in its brief 35-year history, Goldin said.

From 1983 to 1992, NASA's budget doubled, reaching $14.3 billion in fiscal year 1993. However, this budget growth is not likely to continue over the next 10 years due to well-known constraints on the Federal budget. And because the previous growth at NASA raised overly ambitious expectations for the future, programs already approved and underway at the Agency would require funding well over $20 billion by the mid 1990s to continue on schedule.

Therefore, NASA is seeking to become more cost-efficient in everything it does. Internal NASA review teams were able to find ways to absorb a $1.1 billion cut to NASA's requested funding for 1993 without canceling important science spacecraft under development. These include the Cassini probe to Saturn and its moon Titan, a joint mission with the European Space Agency scheduled for launch in 1997, and the Advanced X-ray Astrophysics Facility, the third Great Observatory after the already-launched Hubble Space Telescope and Compton Gamma Ray Observatory.

Overall, the teams identified savings equal to 17 percent of the NASA budget over the next several years. The Space Shuttle review teams pressed harder and found savings of 25 percent by 1995, without compromising important safety upgrades.

The end of the Cold War rationale for the U.S. space program is a second major change confronting NASA, Goldin said. NASA must create a new contract with the U.S. public by replacing its Cold War orientation with a new structure primed to build the nation's economic competitiveness.

Finally, the nation's increasing concern about the health of its educational system means that NASA has a fundamental responsibility to find new ways to use its flight missions, which children find so interesting, to improve education.

Goldin then presented a brief overview of NASA's current programs and a set of charts that attempted to clarify the relative size of NASA's budget, its distinct separation from military space pro-

"As I left the town meeting I reflected on the fact that I've been a taxpayer for thirty years, and this was the first time any government body or agency ever came to me to ask for my opinion on how that money should be spent. I appreciate it."

David Skinnon
Meriden, Connecti

Tampa Palms "Shuttle "astronauts" pose with Colonel Bolden and Administrator Goldin.

grams and its nationwide impact through its network of field centers, space grant colleges and technology transfer centers.

Following the Administrator's opening talk, a special 20-minute video was shown. Originally made for NASA employees, the candid video recounts the glory days of NASA's Mercury, Gemini, and Apollo programs; the productive years of the 1970s that saw the launch of the Viking missions to Mars and the Voyager missions throughout the solar system; and the problematic 1980s that brought cost overruns and technical troubles in many major programs. The video ends on a promising note of improvement for the 1990s, with a diverse set of current employees describing their visions for NASA's future.

Administrator Goldin then returned to the stage to explain what the Agency is doing to reorient itself for the future.

These continuous improvement initiatives encompass procurement and management reforms, greater attention to cultural diversity, formulation of metrics to measure contractor performance, efforts to increase contract awards to small, disadvantaged and women-owned businesses, and a revamping of procedures governing NASA technology transfer.

Goldin ended his talk by outlining the underlying rationale for the NASA vision that has emerged from the Agency's employees. This rationale has four major themes:

- ▶NASA exists to *inspire* people and serve as a source of intellectual nourishment. From a practical standpoint, NASA and its programs are an ideal vehicle to enliven education. From a more philosophical standpoint, the desire to explore and conquer the unknown appeals to a basic component of human nature.

- ▶NASA exists to provide *hope* that the future will be better than the past A hope that our children and grandchildren will enjoy good health, a clean

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environment and a prosperous society.

- ▶NASA exists to create economic *opportunity*, because technological advances are a key way to create new products, new industries and new jobs. And this opportunity should exist for all people, from all cultural and ethnic backgrounds.

- ▶And finally, NASA exists to serve as a *catalyst for peace* in the post-Cold War world.

Goldin then took questions and comments from each audience for about 45 minutes.

After a short break, a panel of top NASA officials led by Col. Charles Bolden, a veteran of three Space Shuttle flights and leader of NASA's internal review teams, took the stage and fielded comments and questions for about two hours. "We are here to listen," Bolden told the audience, but the town meetings are not a "job fair" or a procurement source board, he emphasized.

At every town meeting, demand for time to speak (with a two-minute limit) greatly exceeded supply. The people's desire for information, answers, and actions was overwhelming. Clearly these meetings greatly exceeded the Agency's original goals and objectives.

Before and after the formal town meetings, the NASA officials participated in a number of related events in each city.

The most rewarding of these activities were the morning visits by Goldin and Bolden (and, in Los Angeles, astronauts Franklin Chang-Diaz and Mae Jemison) to local elementary and secondary schools. They talked with individual classes and assemblies of up to 700 students about the importance of studying math and science, and the need to set personal goals just beyond one's reach.

NASA panelists Cecil Rosen, Wes Hammess and Charles Bolden faced many tough questions

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Spellbound Daniels Middle School students watch Colonel Bolden perform an experiment.

The enthusiasm of the students and the depth of their interest and knowledge about space was palpable. Based on later feedback, the impact that the NASA visit had on these economically and culturally diverse schools appears quite profound.

"Thanks is not enough for what your visit to Charles W. Eliot meant to its students and staff members," wrote Delano Yarbrough, principal of Eliot Middle School in Los Angeles. "Your presence on campus, the comments, and the interactions you had with the students were so inspiring and motivational that many students and staff members have established higher expectations of themselves and are reaching for higher challenges. You have given a whole school new hope."

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PRIMARY FINDINGS

...icipants ... NASA's town meet- ...erested in ... the Agency ...d its programs (Fig- ...e 1).

...e process of publicizing and registering attendees for the town meetings produced useful information before the meetings even began.

Given an opportunity on the town meeting registration forms to check an interest in any of seven areas of NASA, the 4,500 attendees showed remarkably consistent interest across every one of the categories.

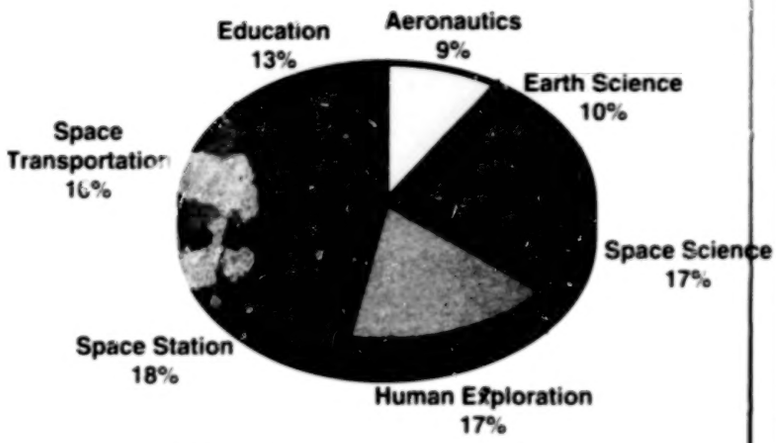

Figure 1—Expressions of Interest

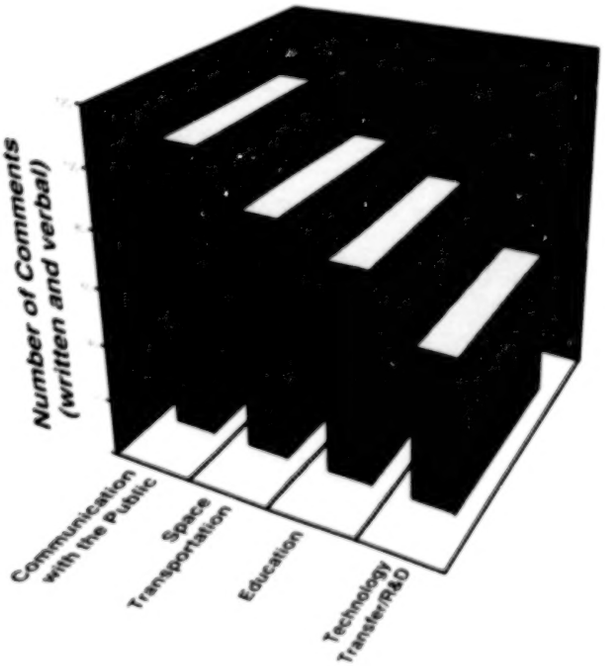

Figure 2—Major Topics

FINDING: Town meeting participants believe most strongly that NASA should...(Figure 2)

- ▶ do a much better job of communicating with the public, both through the news media and via direct means such as television;
- ▶ strive to do more to support teachers.

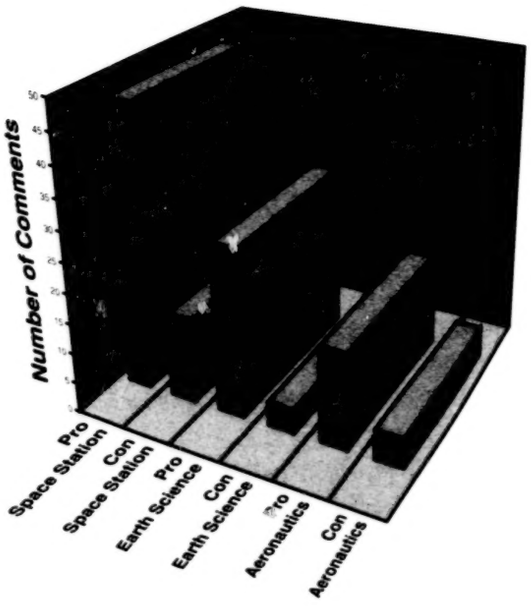

Figure 3—Program Areas

educators and students of all ages and social backgrounds;

- develop a more robust space transportation system;

- improve its technology transfer efforts and pick up some of the slack in national research and development funding as the U.S. defense budget shrinks.

These four broad areas received the most verbal and written comments during the meetings.

FINDING: The Space Station, Earth Science research, and Aeronautics received the most comments of NASA's other major program areas (Figure 3).

The majority of people who commented in each of these areas favored increased attention to them by NASA.

FINDING: The draft NASA vision statement and its related themes garnered a strong positive response during the town meetings. (Figure 4).

The general criticism from meeting participants was that neither is quite bold or specific enough.

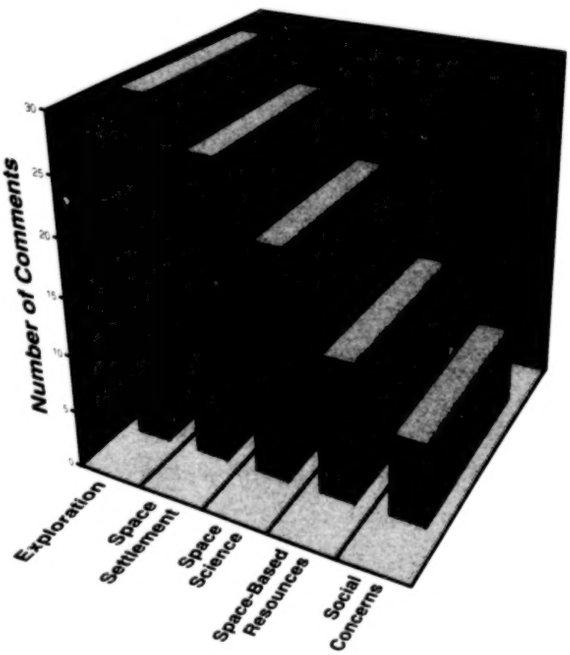

Figure 4—Vision Themes

SUE #1: Participants in ASA's town meetings were terested in all aspects of the gency and its programs.

one of the topic areas on the town eeting registration forms ceived a response less than 8 percent or more than 20 percent at any of the six locations. When averaged across all town meeting sites, four categories (Space Station, Human Exploration, Space Science and Space Transportation) garnered marks between 16 percent and 18 percent. Education (13 percent), Earth Science (10 percent) and Aeronautics (9 percent) received slightly lower totals, but each was the subject of numerous comments and questions during the meetings.

These results indicate that the public overall views NASA as a collection of equally important aerospace-related programs.

ACTIONS: We plan to continue fostering this range of programs by:

- ▶Maintaining our commitment to Space Science, which historically has received about 20 percent of NASA's funding.
- ▶Generating cost savings in the operation of the Space Shuttle, and in other large, hardware-oriented programs, to bring them more in balance with the rest of the Agency's activities.
- ▶Strengthening NASA's Aeronautics programs to help revitalize this critical U.S. industry through greater investment in high-speed flight research, advanced subsonic transport technology and major testing facilities.
- ▶Emphasizing smaller missions, such as Discovery-class science satellites, to spread NASA funding over as many worthy projects as possible.

Examples here include a project known as the Mars Environmental Survey/Pathfinder mission, designed to emplace the first of a series of small stations on the surface of Mars; the Lunar Scout mission, which consists of two remote-sensing science spacecraft that would study the Moon from lunar orbit and help lay the groundwork for eventual human exploration; and a recent request for proposals for lightweight science

instruments that could be installed on a small satellite bound for Pluto.

- ▶Building and using a Space Station, the crucial next step in learning to live and work in the harsh environment of space.

Initial on-orbit assembly of the international outpost is currently slated to begin in about three years. Once occupied, it will serve as a permanent, shirtsleeve laboratory where scientists from all participating nations can use the microgravity environment of low Earth orbit to perform fundamental studies and industrially oriented research in biomedicine and materials science.

Most importantly, The Space Station will enable us to study human physiology under the stress of abnormal conditions in unprecedented detail. Such knowledge promises unexpected medical findings and irreplaceable operational experience that will lay the groundwork for sustainable human exploration of the Moon and Mars.

Successful assembly and operation of the Space Station will demonstrate to all of NASA's stakeholders that the Agency can deliver on its promises.

ISSUE #2: NASA must do a much better job of communicating with the public, both through the news media and via direct means such as television.

The need for NASA to communicate more effectively and more frequently with its customers, the citizens of the United States, was the most uniform message sent from town meeting participants.

Roughly one-sixth of all 600 written and verbal comments and questions gathered through the meetings* featured admonitions or recommendations to improve publicity about NASA and its accomplishments.

People everywhere complained that they usually hear very little about NASA, beyond occasional Shuttle launch information, scattered results from science probes and news stories on technical or managerial problems. Shuttle mission results and technology spinoff success stories were cited repeatedly as areas that need special attention.

There was nearly unanimous opinion that more effective communication in the 1990s starts with improved use of television, including the major networks, cable and public television. Many people were unaware that NASA has its own channel, called NASA Select, and they wanted more information about how to get it on their local cable systems. Others recommended that NASA go one step further and develop a monthly

* Only the major themes of a long letter or verbal statement were counted toward the statistical totals, although all comments were read and considered in their entirety.

magazine, a TV advertising campaign or a Saturday morning show for children.

ACTIONS: NASA acknowledges the fundamental importance of improving our communication with the public and accepts the challenge. We plan a multi-pronged approach to address this issue:

- ▶Improving the quality of information available for print media has been the focus of our attention for the past six months.

Medical and science writers at newspapers with circulations of more than 100,000 now are regularly receiving NASA news releases. A survey of the major media serving the minority community helped produce a significantly upgraded mailing list for these outlets.

We also are reassessing the general readability of NASA news releases to make them easier to understand and use, while retaining their technical accuracy.

- ▶Upgrading NASA Select TV and its programming is now our top public affairs priority.

Our initial emphasis has been on raising public and media understanding of scientific experiments aboard Space Shuttle missions. Recent TV news stories seem to reflect a better awareness of this research, aided by daily mission briefings and more frequent access to Shuttle astronauts during the flight.

In the coming months, we will hire a new executive producer for NASA television who will help oversee further improvements to our Shuttle and space science coverage, as well as the overall quality of our day-to-day programming. A state-of-the-art audio-visual center in the new NASA Headquarters building should help this effort by consolidating and modernizing our television activities in the Washington, D.C., metro area.

- ▶Interactive programming will become more and more frequent on NASA Select, with school classrooms or groups of journalists speaking directly with NASA science experts and astronauts.

We also recognize the desire of many town meeting participants to have a permanent link into NASA to make comments or ask questions, either through a toll-free number or a computer bulletin board address. While this idea has obvious appeal, it also raises numerous concerns, including the cost of assigning full-time staff to this duty and possible inconsistencies in how various submissions would be evaluated. However, we will investigate the feasibility of

"The 'New NASA' look and revised objectives are encouraging improvements, but getting them fully implemented will be a terrific challenge! NASA, like most governmental agencies, has been a low-productivity organization, not keenly motivated and highly self-protective. NASA's very existence may depend on the changes outlined [at the town meeting] and their effective implementation."

Richard Wallace
Bellevue, Washingt

this idea and weigh it against other avenues for public outreach.

▶A similar upgrade is underway for NASA's radio programming. We plan to emphasize more live and live-to-tape interviews over the prerecorded programs most common in the past.

Administrator Goldin and Colonel Bolden are interviewed on a student-run television talk show, Tampa Palms Elementary School.

▶NASA's public speaking program is being reviewed to ensure that the most informed and gifted speakers throughout the Agency have the opportunities and the materials necessary to reach the widest possible audiences.

▶Drawing upon reactions to NASA exhibits at several recent industry expositions, we are making plans to assemble a major traveling exhibit on the Agency.

This new exhibit will be designed to reach citizens outside of the mainstream aerospace community, at locations such as large state fairs and local history or science museums.

▶We also will continue to produce specialized programming in the form of press briefings and mission-related video news releases. We recently have begun increasing our use of computer animation, charts and graphs, and other compelling visual formats.

However, we do not believe it is NASA's role to sponsor or generate a regular series for commercial or public television. In the same way, we believe it is much more cost-effective for NASA to work closely with existing newspapers, magazines and newsletters through press releases and interviews rather than compete with them by producing mass circulation products

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on our own, as was suggested frequently during the meetings.

Citizens interested in seeing more coverage of science, technology and space must make it known to their local news media and cable companies. Many smaller newspapers and television stations do not have regular reporters or columns dedicated to science and technology. However, they may respond to expressions of interest from enough of their readers and viewers.

ISSUE #3: A more robust space transportation system must be developed to support all aspects of space exploration and development.

The need for NASA to take the lead in improving U.S. space transportation capabilities and access to space received the most attention of any programmatic area of NASA discussed during the town meetings. More than 85 comments dealt with this issue in some manner.

Many of the comments appeared to be based on a general skepticism that the Space Shuttle can launch the Space Station safely and cost effectively. Several university space scientists complained that the Shuttle system is too costly and should be phased out immediately.

Participants presented many innovative ideas.

More than a dozen people suggested that NASA directly purchase the Russian Energia heavy-lift booster or other Russian rocket hardware to launch the Space Station. A few others focused on a new U.S. heavy-lift launcher, such as a modified uncrewed Space Shuttle, or something similar to the proposed National Launch System or the more recent Spacelifter concept.

Over 32 comments advocated more attention by NASA to advanced space propulsion technology like nuclear propulsion or rail guns. Ten comments urged greater consideration of the single-stage-to-orbit technology being developed by the Strategic Defense Initiative Organization. Nine comments supported more funding for hypersonic technology related to the National Aerospace Plane.

ACTIONS: NASA recognizes the fundamental need to improve U.S. access to space.

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"The many self-serving statements regarding NASA's mission and achievements serve to highlight my misgivings about the status of the agency. In particular, flights of fancy regarding resources and benefits that might accrue from human, Mars, moon and asteroid exploration are not founded in science."

Anonymous
Tampa, Florida

Several recent attempts to develop new space launch systems have stalled or failed for a combination of reasons, including high development costs, immature technology and a lack of consensus on the range of requirements and traffic models the system should support.

► It will require the immediate, sustained attention by the new Administration and Congress to overcome these issues and establish a meaningful long-range strategic plan for space transportation.

This plan must balance the interests of NASA, national security, the U.S. commercial launch industry and the need for fair competition in the international marketplace.

► With an eye toward the next century, NASA has begun formulating and assessing three primary options for the next two to three decades of space transportation.

The most conservative track will look at specific upgrades to the Space Shuttle system that could enable it to operate throughout this period at much lower costs and higher reliability than today.

A second option will consider modest improvements to the Shuttle to keep it flying efficiently until a new multipurpose family of expendable boosters and space vehicles could be phased in. One of these boosters could carry a small piloted vehicle known as a Personnel Launch System that would be capable of ferrying astronauts and a small payload back and forth to the Space Station. This approach would be combined with robotic cargo vehicles designed to carry payloads from Earth to orbit and transfer them between various orbits.

The third option will attempt to evaluate the myriad of launcher concepts based on advanced technology that promise "leapfrog" improvements over traditional systems. Among the trade-offs under consideration here are reusability, technology readiness, development cost and risk, and the possible mixes of airbreathing and rocket stages.

► Whatever this review concludes, it is clear that the Space Shuttle will continue operating for at least the next decade.

Therefore, we plan to pursue a prudent series of system upgrades and improvements to the Shuttle fleet. These upgrades include better main engine components, computer displays and power-generating fuel cells, as well as programmatic changes to continue reducing Shuttle operations costs.

Other possible modifications would enable a Shuttle to remain in orbit for extended periods, either

by itself or docked to a partially built Space Station, providing early opportunities for weeks-long sessions of microgravity research.

- ▶Numerous recent internal studies and reviews at NASA have examined alternatives to the Space Shuttle to launch the Space Station.

The latest evaluation, performed in the fall of 1992, again concluded that these alternatives do not show substantial cost savings or risk reduction compared to the Shuttle. However, future resupply of the Space Station may be best accomplished by a mix of launch vehicles, and we continue to study various options.

- ▶Bulk purchases of Russian launch hardware for U.S. government needs are not practical and would cause undue harm to the U.S. launch industry.

Despite the admirable launch record of the former Soviet Union, it is important to remember that the Energia has only flown twice, the last time in November 1988.

Modifying existing U.S. launch pads or building new ones to support Russian hardware is prohibitively costly. If large or complex U.S. payloads were to be launched from Russian sites, a major transportation and launch support infrastructure would have to be developed.

We believe that the relationship between the Russian and U.S. space programs must be allowed to build gradually, beginning with an astronaut exchange program already underway.

The best way for a flexible, long-term relationship to grow is through the numerous company-to-company contacts that have begun to flourish during the past year. Once mutual confidence and greater technological compatibility has been established, much greater cooperation between our nations should be possible.

- ▶A recent reassessment of our priorities in aeronautics, which included major industry participation, concluded that hypersonic flight programs like the National Aerospace Plane are not at the top of the nation's immediate aeronautics technology needs.

We plan to continue hypersonic research at a reasonable level in the coming years to keep this field alive and moving forward. If the nation decides to pursue a path toward a "leapfrog" improvement in space transportation technology, it could be returned to full development.

Advanced systems like nuclear propulsion, electric propulsion and rail guns remain more distant, specialized options for space transportation. But we plan to continue

"We should raise money for space exploration at least 50 percent from private industry and public donations. One of the [NASA] panelists mentioned that the law does not allow NASA to solicit funds. The law, then, should be changed."

Suresh Bhaskara
Tampa, Florida

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Panelist Deidre Lee, Wes Huntress and Gregory Reck listen intently to a question from the audience.

our collaborations with the Department of the Defense and the Department of Energy in developing the basic technology and engineering knowledge for these systems. We also are discussing possible flight experiments in this area, such as a solar-electric propulsion test vehicle.

In the long-term, it appears certain that a combination of space vehicles that includes one or more of these advanced systems will be necessary to support human exploration of Mars.

ISSUE #4: NASA should strive to do more to support teachers, educators and students of all ages and social backgrounds.

Sparked by invitations from NASA for a local teacher to speak at each town meeting, the issue of education was raised repeatedly during the meetings. More than 70 direct comments relating to science and technology education were received.

Participants urged NASA to become more active in producing educational materials and in training teachers. Female students (8 comments), minorities (5 comments) and adults seeking ongoing education are worthy of special attention, according to several town meeting participants.

In many cases, it appears that the problem was not the quality or volume of educational materials available from NASA, but rather a lack of widespread publicity about how and where to get them. We received more than two dozen specific requests for further information on NASA's Education programs.

We will continue to maintain close coordination between our education programs and policies and related efforts by the Department of Education and the education committee of the Federal Coordinating Council for Science, Engineering and Technology (FCCSET).

One near-term possibility is a more formal relationship between NASA's Space Grant Colleges and the Land and Sea grant colleges fostered by the Agriculture and

Commerce departments, respectively.

ACTIONS:
NASA has just completed a major overhaul of its strategic approach to education, detailed in a newly published long-range plan titled "A Strategy for Change: 1993-1998."

Dr. Mae Jemison, the first African-American female astronaut, shares her experiences with high school students at the California Institute of Mathematics and Science.

It is also important to note that NASA's budget for education-related programs has increased 260 percent since 1989, to $70.2 million in FY 1993.

Although we currently interact with more than 135,000 teachers and 2 million students per year, we know that there is a need to reach even greater numbers.

- Enhancing teacher training is NASA's highest priority in elementary and secondary education.

We have several initiatives underway to expand opportunities for teacher in-service workshops, with the goal of tripling the number of teachers having one-on-one contact with our field centers by 1998. For example, we plan to increase the annual number of teachers at our NASA Educational Workshops for Elementary School Teachers (NEWEST) and NASA Educational Workshops for Mathematics, Science and Technology Teachers (NEWMAST) by 50 percent in 1994.

- Dissemination of educational materials should be improved through our recently updated dissemination strategy. It emphasizes a physical presence in each state through the resource centers and our Space Grant College consortia, and greater use of electronic systems such as Spacelink and NASA Select TV.

Other planned efforts in this area include a new toll-free telephone number to access NASA Spacelink, better file transfer capability over Internet, and upgraded technology for duplicating slides and videos within our Teacher Resource Center Network.

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►For teaching materials, we plan to increase our focus on supplementary curriculum materials using software and multimedia products, such as videodiscs and CD-ROM databases. Mission-related programs will receive particular attention.

►To strengthen the link between space research and school course work, we have developed a nearly continuous series of in-orbit lessons and demonstrations by Shuttle astronauts. Some of the most extensive demonstrations yet were carried out aboard the STS-54 mission in January 1993.

►The Space Science Student Involvement Program has been expanded to lower grades (3-12), as recommended by several town meeting participants.

Program contests are conducted in Interplanetary Art, Future Aircraft/Spacecraft Design, Mission to Planet Earth, the Mars Science Expedition Project and Aerospace Internships. These opportunities are available to teachers and students in all 50 states.

►We plan to re-examine our balance between graduate and undergraduate university student funding.

Although large amounts of new funding for university scholarships and other means of financial support may be difficult to obtain in the current budgetary environment, we must attempt to ensure a strong undergraduate student pipeline.

►NASA also recognizes the need to help all of the citizens of the United States become and remain scientifically literate.

In 1992 alone, more than 4.8 million people visited NASA Visitor Information Centers. With new space museums associated with NASA centers in Houston and Hampton, Va., we plan to continue expanding our efforts in this area.

In addition, NASA has called upon our partners in industry, through the NASA/Industry Education Initiative, and our partners in academia, through the National Space Grant College and Fellowship Program, to develop community outreach programs that reach all segments of the general population. Special emphasis will be placed on communities that are geographically distant from NASA facilities.

ISSUE #5: Town meeting participants believe strongly that NASA must increase its technology transfer efforts and pick up some of the slack in national research and development fund-

ing as the U.S. defense budget shrinks.

More than 53 comments related in some way to the need for NASA to play a bigger role in the economic competitiveness of the country. Most comments were general in nature, with 16 focused on the need for a strong R&D program at NASA, and 15 often-poignant comments on the skills being lost through widespread layoffs in the aerospace industry.

Furthermore, after every town meeting, dozens of attendees surged toward the stage and surrounded Greg Reck, acting associate administrator for the new NASA Office of Advanced Concepts and Technology, to share ideas and exchange addresses.

One common theme was a desire for the Agency to find ways to receive larger amounts of money from NASA-developed technology that is licensed or patented by industry for commercial use.

ACTIONS: NASA recognizes the need to pay much closer attention to national needs and capabilities in advanced technology.

- ▶Several long-awaited events on NASA's 1993 calendar promise to make it the most active year in the brief history of the Agency's commercial programs. The initial launch of the privately built Spacehab pressurized module aboard the Shuttle, the first launch of the Commercial Experiment Transporter (COMET), the first flight of the Wake Shield Facility and the launch of the Advanced Communications Technology Satellite (ACTS) should provide nearly exponential increases in access to orbit for commercially oriented space research.

- ▶NASA's Office of Advanced Concepts and Technology was formed in October 1992 to be a "one-stop shop" for people and businesses with fresh technical ideas and the desire to apply NASA technology in the marketplace.

This multipurpose office will serve as the primary source of NASA expertise in advanced technology for customers both inside and outside of the Agency. It also will seek new alliances with industry and universities in an attempt to abolish the "Not-Invented-Here" syndrome sometimes found in NASA by creating a flexible organization with a strong systems engineering capability and a willingness to give impartial analysis to all incoming proposals.

- ▶This new office will be the focal point for more effectively transferring NASA technology into the private sector.

"NASA must admit to itself and to the people that it is a research organization, and that's it. It is not a social service operation, nor is it a commercial enterprise. Spin-offs and technology fall-out will occur, but its primary business is research. Cutting edge stuff."

Curt Hudelson
Long Beach, California

Even prior to the town meetings, NASA recognized that its technology transfer activities needed serious attention.

In early January, a special internal review team issued a blunt report on NASA's technology transfer activities and policies. The team found that NASA's technology transfer efforts were too scattered and informal, and they depend too much on the personal initiative and patience of individual researchers.

Students and professors demonstrate the use of advanced robotic technology.

The study team identified six items which may be used to track NASA's future effectiveness in technical transfer, and it singled out a series of cultural changes that must take place in NASA before the Agency can make major improvements. For example, the team recommended that technology transfer be mentioned explicitly in the NASA vision and values statement. And it suggested that technology transfer metrics play a bigger role in employee promotions.

As a result of this review, technology transfer was established formally as a "major initiative" within the Agency, with resulting requirements in the overall performance evaluations of NASA's field centers and their training of employees.

▶The review team also saw a potential for increased revenue from patents and licenses.

NASA currently is reviewing its patents and licensing procedures to reduce paperwork, simplify regulations and increase dissemination of information about new opportunities. However, the Agency's annual income from patents and licenses is unlikely to ever grow large enough to be a primary source of funding for the Agency.

We believe instead that NASA should be viewed as one of the federal government's primary channels for developing cutting-edge, high-risk technology, not as a profit-making activity. To reorient NASA around the pursuit of signif-

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icant income from technology licenses would fundamentally change its mission as an agent of exploration and knowledge in the national interest.

ISSUE #6: Monitoring and protecting Earth's environment is a primary concern of participants in the town meetings.

More than 32 different comments related to NASA's role in environmental research. Sixteen comments raised the issue as a general area that NASA should focus on. Twelve comments specifically supported increased emphasis at NASA on Earth science programs or the Agency's Mission to Planet Earth initiative. Four comments questioned whether such research more properly belongs in other federal agencies like the National Oceanic and Atmospheric Administration, or in private industry.

ACTIONS: Earth science has been and will continue to be one of NASA's top priorities.

- In October 1992, Mission to Planet Earth was broken out from the NASA Office of Space Science to become its own separate entity, raising its public profile and strengthening its links with senior NASA administrators.

- The planned Earth Observing System (EOS) has undergone nearly constant external review during the past three years to ensure that it provides the most relevant Earth science data at the earliest reasonable date. To minimize its development costs, EOS has been recast into a series of small- and medium-sized satellites sharing similar designs.

We plan to invest $8 billion in EOS through the end of the decade. The first EOS satellite is slated for launch in June 1998.

- A contractor has been selected for the crucial EOS Data and Information System and will soon begin work developing a prototype data network by the end of 1994.

- NASA's Earth Probes series of small satellites has received full funding the past three years. These satellites will fill gaps in measurements not taken by larger satellites while providing invaluable experience in building space hard-

Proposing a new vision for NASA.

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"The question of which way to go in space should not be one of whose committee has the most clout or whose pet program might get squashed. It should be resolved by plainly recognizing what can and cannot be accomplished in a reasonable amount of time with a reasonable amount of resources."

Paul Daugherty
Brandon, Florida

ware for young program managers.

- ▶Advanced satellites like the Upper Atmosphere Research Satellite and TOPEX/Poseidon ocean circulation satellite are already in orbit producing new knowledge about Earth's atmosphere and oceans that will lay the groundwork for EOS.

- ▶Continuation of the unique remote-sensing data stream from the Landsat series of satellites has been ensured through an agreement with the Department of Defense for joint management and initial funding for Landsat 7. This data is useful for scientific, commercial and national security applications.

- ▶NASA will continue to play a leadership role in the multi-agency U.S. Global Change Research Program, contributing the Agency's unique capabilities in spacecraft development, operations and data interpretation. In addition, we will continue to negotiate a variety of international agreements for exchanges of Earth science data and instruments so that global change information is available to researchers from around the world.

ISSUE #7: Interest in NASA's renewed support for aeronautics research and technology development varied from meeting to meeting. Once the issue was discussed in the context of the future international competitiveness of the U.S. aviation industry, the response from attendees was generally positive.

Some town meetings featured several comments and questions on aeronautics, while others focused completely on space-related issues. Overall, more than 21 direct comments on aeronautics were received, with 16 of those clearly supporting a sustained program of technology research.

Historically, NASA and its precursor, the National Advisory Committee on Aeronautics (NACA), has played a key role in fostering advanced aviation technology.

However, U.S. market share in this important worldwide industry has dropped from 91 percent in 1969 to 67 percent and falling, with U.S. airplane manufacturers announcing further employee layoffs almost every week. Sales of general aviation aircraft have dropped from 18,000 in 1979 to roughly 1,000 today.

ACTIONS: Following a series of meetings last fall with the nation's major airframe and jet-engine builders, it became clear

that NASA must realign its priorities in aeronautics.

- ▶A new NASA Office of Aeronautics has been created to separate this important work from other advanced research and technology development in the Agency. Dr. Wesley Harris, a respected aeronautical engineer and former vice president of the University of Tennessee Space Institute, has been named associate administrator of the new office.

- ▶We plan to focus greater attention on research for high-speed and subsonic aircraft.

In the high-speed area, we intend to work closely with industry to kick start the joint development of an environmentally safe High Speed Civil Transport. Properly designed and funded, this supersonic vehicle promises to satisfy a huge and growing market for fast, affordable commercial air travel to the Pacific Rim and other intercontinental destinations.

NASA can also contribute crucial expertise to traditional subsonic transportation. One of our highest priorities is integrating new air-traffic control and communications technology into a system that will safely and efficiently interconnect the next generation of advanced subsonic aircraft, from transcontinental airliners to single-engine planes.

This thrust would complement traditional NASA research into technologies that make airplanes safer, more quiet, more fuel efficient and more environmentally friendly.

- ▶Our third priority is refurbishing our national aeronautical research facilities to ensure that their equipment is world class and their productivity is second-to-none. A comprehensive 15-month review by NASA, the Department of Defense and industry of the current capabilities of U.S. wind tunnels and propulsion test beds is already underway.

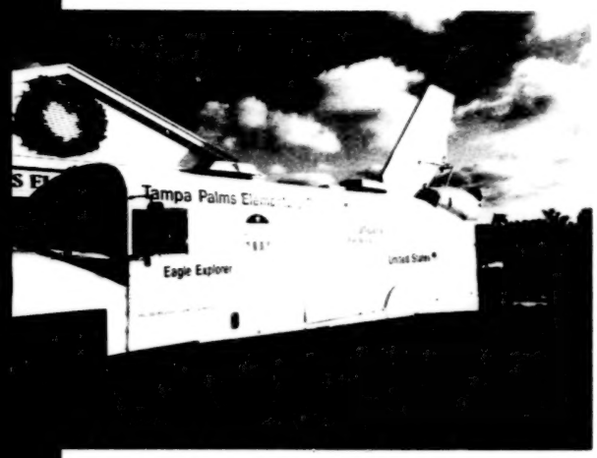
- ▶Our fourth priority is to continue our partnerships with the Defense Department and industry in pursuing critical hypersonic technology and flight demonstrations of its key elements, in preparation for a future research vehicle.

Aggressive research in hypersonic flight technology is needed to maintain U.S. leadership in this field, in anticipation of future international competition. In addition to promising lower-cost access to space, these technologies have important military applications.

- ▶Finally, we plan to pursue an overall funding increase for aeronautics well above its current level of $1.1 billion a year, which amounts to only 7.9 per-

"If NASA is really interested in forming an agenda in response to their constituencies, then more in-depth town meetings should be conducted. I am concerned that the [first] town meetings are not going to give Headquarters the true view."

E. Agee
West Lafayette, Indiana



A creative approach to educating children about space.

cent of NASA's current budget. A better balance of funds is required to meet the needs of the U.S. aviation industry, which represents nearly 600,000 jobs and annual sales of about $95 billion.

ISSUE #8: The draft NASA vision statement and its related themes garnered a strong positive response during the town meetings. The general criticism from meeting participants was that neither is quite bold or specific enough.

More than 115 comments dealt directly or indirectly with an overall vision for NASA's future. Fourteen comments explicitly approved of the current NASA vision statement, with two nay-sayers recommending that it be reshaped to appear more serious in tone.

Most people recommending changes to the vision advocated a heavier emphasis on human and robotic exploration of the moon and Mars (30 comments) or made a reference to ultimate human settlement and colonization of space (26 comments). In a related topic, 12 comments suggested a larger role for the pursuit of space-based resources such as lunar helium-3 or solar power satellites.

About 20 comments urged that Space Science become the unifying focus for NASA. And a half-dozen people were more narrowly focused, suggesting that NASA simply pledge to provide the "infrastructure" (mainly cost-effective space transportation and related technology) necessary to enable large numbers of people to explore and develop space.

ACTIONS: The NASA vision statement continues to evolve in response to comments from employees, outside groups and the findings from the town meetings.

- ▶We will maintain a vision that is broad enough to encompass all of our traditional program areas, including Space Science, Human Exploration, Mission to Planet Earth and Aeronautics. We believe that this balance must be fostered continually to keep NASA strong, intellectually and politically.

- ▶We plan to continue discussions with all of the stakeholders in NASA — including the

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public, our contractors, the Administration and Congress, and our international partners — over the next several months to refine the vision further.

▶NASA's senior management group will review all of these inputs during the spring and summer of 1993, with the goal of publishing a new shared vision for the Agency by the fall, in time for it to help shape our 1995 budget request.

Future "astronaut" demonstrates an experiment.

OTHER ISSUES AND ACTIONS:

▶Industry representatives in the audiences often criticized NASA's acquisition policies and related paperwork requirements.

Several aerospace engineers offered suggestions to improve space systems development, frequently concentrating on proposals that NASA adopt more of a "performance specifications" approach that gives industry greater latitude to make trade offs between design cost and operations concepts. The Agency has made significant efforts over the past year to address similar recommendations, and an internal program excellence team is currently revising NASA's basic systems development policies to make them more flexible.

Numerous small business owners and executives at the town meeting urged NASA to expand its small business contracting and lessen its procurement-related paperwork demands. They generally praised the Agency's recent initiatives to involve more woman- and minority-owned companies in NASA contracting, but complained that the distinctions between the different categories need to be refined. Both of these activities already are underway.

Public law mandates that NASA set a goal of awarding at least 8 percent of its annual prime and subcontract dollars to small, disad-

"Yes, there is a need for better focus [at NASA], trimming bureaucracy and for reducing mega-contractor dependency. [But] it strikes me that what space enthusiasts want is not just a reinvigorated NASA, but to have a complete space infrastructure dumped in their laps, batteries and tutorial included."

Colin Keizer
Fall City, Washingto

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vantaged and women-owned businesses. This law set no date, but we have pledged to accomplish this goal by 1994, and already are near it, with 1992 awards at 7.2 percent.

In addition, in December 1992, NASA announced a special determination and finding that sets aside $310 million worth of mostly high-tech service and support contracts for the small business community. Funding for Small Business Innovative Research (SBIR) awards also is projected to increase during the next several years.

To help us look for new opportunities and broaden our contractor base, we have formed a NASA Minority Business Resource Advisory Committee. This group held its first meeting in mid January.

To address the paperwork problem, NASA has created a new class of purchases called Mid-Range Procurements for contracts valued between $25,000 and $500,000. Documentation for these contract awards has been cut from more than 100 pages to 10 pages. We hope to start offering the first test cases under this procurement project in mid 1993.

- ▶The push for greater cultural diversity in the NASA workforce also was widely applauded, although a handful of mostly anonymous commentators derided the initiative as a quota system.

NASA believes that a diverse workforce is a stronger workforce, and that we have a moral obligation to foster role models for students of all ages, races and ethnic background. It is important to be aware the job qualifications do not always end with test scores and raw technical expertise — successful high technology ventures of the 21st century will need the support and participation of all aspects of our culture.

- ▶Several town meeting participants were concerned about detecting and deflecting asteroids that could strike the Earth.

NASA studies asteroids both from space and from the ground. About 30 Earth-approaching asteroids and comets have been detected worldwide, and NASA received extra funding this year to upgrade instruments at three ground-based astronomical observatories to bolster this detection effort.

However, NASA is not actively involved in examining possible responses to asteroids that threaten to hit the Earth. The national laboratories of the Defense and Energy departments have more appropriate expertise to investigate asteroid deflection techniques and technologies.

▶For a mix of altruistic and practical reasons, expanded international space cooperation was a uniform desire of nearly all the participants in the NASA town meetings. Every meeting featured at least several calls for increased outreach to Russia, although such comments often appeared to be driven more by potential budgetary savings than by a desire for more peaceful relations.

A child's curiosity about space ignites the desire to learn.

Various concepts were proposed for an international space agency associated in some way with the United Nations. We believe it is premature to create such a formal structure, and in any event, a decision to do so is beyond the purview of NASA. However, it is clear from the tone of the town meetings that most people want all large future civil space projects, such as a human mission to Mars, to be a fully international undertaking.

The seeds for this undertaking already have been planted. The Space Station is the largest technology-oriented international project in history, with formal participation by Canada, Japan and 10 nations from Europe through the European Space Agency. Virtually every scientific probe launched by NASA features extensive international cooperation among its instruments and science teams. Mission to Planet Earth, a naturally global undertaking, already is emerging as the new standard in this area.

We expect and hope that international space cooperation will only continue to grow in the future, especially with new partners among newly industrialized nations and the independent states of the former Soviet Union. For example, NASA has demonstrated its eagerness to cooperate with Russia by negotiating and signing a landmark agreement with the Russian Space Agency to fly a cosmonaut on the Shuttle in late 1993 and later dock a Shuttle with the Mir Space Station.

▶Beyond international cost-sharing, town meeting participants proposed a variety of ways for NASA to seek new

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"The earth is crowded. Let's spread out. People should still be going out into space. Robots can't totally observe. What about feelings? If there is something scary, frightening, exciting, wonderful or beautiful that happens, how will a robot know?"

Elizabeth Friedle
Yorktown, Indiana

funding, ranging from direct donations to a check-off box on federal tax returns for contributions to the space program.

Under present law, NASA receives its funding through the appropriations process and through the acceptance of unconditional gifts. Obtaining funding through other means, such as conditional gifts, lobbying the private sector, check-off boxes on tax return forms or the use of the NASA logo for promotional purposes are precluded by law. Nevertheless, these suggestions will be considered and, where feasible, possible changes to the law through the legislative process will be pursued.

Several people eager to fly in space suggested some sort of lottery, with a ride on the Space Shuttle as the prize. While this idea has obvious appeal, we believe that human space flight remains risky and costly enough that it must remain limited to highly trained specialists in the near future. But we will never forget that the hopes and dreams of all people ride with us on every mission.

TOWN MEETING PROCEEDINGS

First Town Meeting

Raleigh, North Carolina
November 9
North Carolina State University

The town meeting re[illegible]any of the themes that wo[illegible]cur repeatedly in the m[illegible]o come. Held in the ho[illegible] of several NASA pione[illegible]luding the late James W[illegible]agency's second administ[illegible]d the late Ron McNair, a member of the final Space Shuttle Challenger crew, the tone of the meeting was upbeat, polite and supportive of a strong U.S. civil space program. Many people thanked NASA for coming to their town and asking about their opinions.

The most common issue raised during the Raleigh meeting was the need for NASA to improve and broaden its public information activities. A comment by audience member Don Crawley of Cary, N.C., was typical: "I would like to see NASA do more 'marketing' of how important space exploration has been and will always be towards our development as a technology dependent planet."

Citing the recent success of independent U.S. presidential candidate H. Ross Perot, numerous people directed NASA to use television more frequently and effectively to transmit its accomplishments directly to the public. "The average citizen is not aware of how NASA technology affects their lives," said one anonymous written comment. "If they did, they would probably be more supportive of the program."

Both public television and cable television were cited as possible venues. Several people also recommended that NASA take better advantage of the nation's ever-expanding network of computer bulletin boards to publish information.

The most common complaint, especially among teachers, was the dearth of easily accessible summaries of the results from experiments flown aboard the Space Shuttle. "We hear about the experiments, but never about the conclu-

sions," said Melissa Brown, a science teacher at Broughton High School, who noted that 77 percent of her students were unable to identify what the acronym NASA stands for.

"The truth is, the attention of our youth has been diverted to other things," wrote Mickey Scott of Raleigh, who suggested that NASA be even more aggressive and pursue novel ideas such as sponsorship of the halftime show at the Super Bowl, joint promotions with fast food restaurants, a line of educational toys or a Saturday morning TV show on space science.

The need for NASA to expand its support of science and technology education, and educators, clearly emerged as a second major theme in Raleigh. NASA was urged to increase the availability of teaching materials, expand teacher training and enlarge its cooperative education programs.

Two teachers from rural communities in North Carolina exhorted NASA to concentrate more of its resource in low-income areas. "Many students of these schools have little or no hope of going further than high school," wrote substitute teacher Elaine Hancock. "If these students can be 'turned on' to science and aeronautics, and if they can be made aware of jobs available for high school graduates, they can develop goals for the future."

Several other teachers encouraged NASA to pay more attention to female students. "Girls need role models," said Barbara Ann Hughes of Raleigh.

Most comments on the overarching vision of NASA presented at the meeting were positive. "Keep your future orientation" was a typical comment.

"NASA must take this grand vision as its goal and then let the engineering and science fall in to see it through," stated John Shelton of Durham. "Not the other way around."

A few people complained that the ultimate objective of the vision is not clear enough. George Reeves of Raleigh suggested that the vision should revolve around low-cost access to orbit, and the resulting human settlement of space. "Transport cost reduction is the key to space access for all who want it," Reeves wrote. "Offering every citizen a chance to vacation or work in space is a national goal that would have great appeal."

Within the NASA vision, many attendees applauded NASA's increased focus on cultural diversity in it's work force. One person suggested that this effort be expanded to focus on contracting to "large industries" in counties

Colonel Charles Bolden, veteran of three shuttle flights, most recently commanded the ATLAS study of Earth's atmosphere.

with per capita incomes below the national average. However, one anonymous writer expressed anger over the appearance of an emerging quota system.

Several people recommended that technical excellence be featured more prominently in the NASA vision. "NASA needs to concentrate on zero defects, not on employees who have really high quality social experiences while at work," stated one anonymous comment.

The proximity of three major universities and the North Carolina Research Triangle Institute seemed to spur several comments on the importance of NASA maintaining a strong program of basic research in both science and technology.

NASA also needs to do a better job of recognizing and nurturing the potential commercial applications of this technology earlier in the development process, one speaker emphasized. "It is no longer sufficient to develop things and try to place them" in the market, said Larry Sumney, president of Semiconductor Research Corp. in Research Triangle Park. "It has to be done concurrently."

Several speakers expressed concern about the long-term safety of the Space Shuttle system, and its ability to sustain construction of the Space Station. Some suggested that cooperation with Russia and use of its heavy-lift Energia booster would be a better alternative for launching the Space Station.

There was widespread support for continuing, and even expanding, NASA's programs in environmental research and Earth science, known as Mission to Planet Earth.

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"Either the president or the head of NASA or both will not only have to set the technical direction of NASA; each will also have to outline the idealism inherent in exploration. This is essential."

Michael Nash
Greensboro,
North Carolina

"I feel it is critical that we move forward with this project immediately," wrote Susan Lassiter of Blanch. Theodore Harper of Cary was one of a minority that believes these types of projects should be left to NOAA or the commercial space industry.

The agency's new emphasis on aeronautics and supersonic transport technology also was welcomed in Raleigh. "This program is essential to provide the support our aircraft industry needs to a get a high speed aircraft into production," wrote one attendee.

A graduate of North Carolina State in humanities ended the first half of the meeting with the most skeptical question of the day.

Ron Klein, a self-described "space enthusiast," said that he has grown "increasingly uncomfortable with NASA's message of exploration and national prestige at time when there are so many social problems. Are there long-term goals, such as exploration of Mars or the moon, that it might be appropriate to delay in order to direct resources to solve social problems?"

NASA Administrator Goldin responded that he was sympathetic to such feelings, but concerned that they ignore the importance of NASA's role in creating "opportunity for the future."

"What hope does a child in the inner city have if no one is creating a job for that child in 10 or 20 years?" Goldin asked. "What hope does that child have if nobody is paying attention to the environment they live in? You cannot put off the future to live in the present."

Second Town Meeting

Hartford, Connecticut
November 17
University of Hartford

In a regi[illegible] several major space f[illegible]cluding some [illegible]loyee layoffs, [illegible]eting featured [illegible]erns ab[illegible]future of U.S. [illegible]nology [illegible] and develop-[illegible]t, and th[illegible] of the educa-[illegible]l comm[illegible]t supports it.

The expected downturn in U.S. defense spending and increasing economic competition from other nations such as Japan were cited several times as reasons NASA should be supported.

"I don't feel that enough new jobs can be created by protecting our current industries, or by improving our competitiveness or quality of our products," wrote engineer Arnold Marcus of Orange, in a letter sent after he attended the town meeting. "These things will help but they are only stop gap measures. We need new industries for the new jobs."

Several people stated that the imposing bureaucracy at NASA must be reduced before any meaningful progress in mutual technology transfer can be made.

"My company has been approached several times by NASA for our technology but [the bureaucracy and a lack of protection for proprietary information] has kept us from sharing," said one anonymous submission.

NASA must "permit more the Space Station for [its] vendors to use the latest in high technology without inflicting a burden and cost on the paperwork requirements," said Sean Murray of Enfield. "If NASA demands that vendors do it 'faster, better and cheaper' then they must relax the stringent requirements they impose on their vendors but permit a design to [be] proven during certification testing."

The NASA vision statement and its supporting rationale received a strong positive response in Hartford. "The general vision — hope,

"Find a way to give the average [person] a chance to point out something and say 'Here NASA has affected me,' and please bring back the boldness and adventure of the earlier programs."

Eric Vandernoot
Danbury, Connecticut

inspiration, opportunity — is very appropriate," wrote Betty Storrs of Bloomfield. Storrs added that NASA should concentrate on basic science, and pay closer attention to balancing work between government, industry and universities.

However, Edmund Malaspina of Prospect wrote that he believes the NASA vision statement reads "as if it was derived from a Star Trek mission statement." He recommended NASA "reconstruct the statement to reflect a more professional image," centered on economic competitiveness through advanced technology development. And Robert Trail of Winsted said that NASA's vision should be turned more toward unique possible economic benefits of space exploration, such as lunar mining. "Refocus the whole program to exploiting, not exploring, and everything will get rolling," Trail wrote.

NASA's renewed emphasis on aeronautics research also attracted comment. "We should have more of an accent on the 'A' in NASA," said one woman from the audience.

NASA currently spends about 8 percent of its budget on aeronautics-related programs. "NASA's aeronautics budget is not adequate" to keep the United States ahead of its foreign competitors, according to Dick Hines, manager of the supersonic transport propulsion program at Pratt & Whitney. Hines recommended that aeronautics funding be increased to at least 10 percent of the agency's budget.

However, Arnold Marcus wrote that he believes "little if any resources should be devoted" to the High Speed Civil Transport. "I don't see the importance of going to Europe or Asia in a few hours versus several."

Tying together aeronautics and education, 17-year-old Jeremy Browner suggested that NASA become more involved in aviation-oriented schools.

Several other speakers and writers also focused on the need for NASA to provide stronger support for education.

Marilyn Khokahr, a Pratt & Whitney employee pursuing an undergraduate engineering degree at the University of Hartford, urged NASA to improve its links to continuing adult education, especially for women and minorities. Dr. Rudolph Pohl of Branford said that NASA should expand its Lunar Sample Kit program to ensure that at least 1,000 kits of moon rock are circulating through the nation's schools to spark children's interest in science and math.

Physics teacher Mary Blain of Glastonbury High School asked NASA to consider opening up its Space Science Student Involvement Program, which provides

slots on the Shuttle for student-designed experiments, to elementary school students. Several attendees encouraged NASA to publicize its educational materials better, and support larger networks of public speakers for classrooms.

Mary Verselli of Wallingford, a marketing consultant for non-profit organizations, suggested that NASA make better use of volunteers through a program of "NASA ambassadors in every state. Train them, communicate with them regularly and bring them together for an annual meeting."

Apollo 11 astronaut Buzz Aldrin questioned NASA panelists during the Town Meeting at the University of Hartford

Combined with an improved line of educational materials, such a program could "help parents like us tell the story of real live American heroes and adventurers like Buzz Aldrin" instead of fictional characters like Luke Skywalker or Indiana Jones, Verselli wrote.

Apollo 11 astronaut Aldrin spoke briefly at the Hartford meeting, praising the concept of the town meetings and recommending that NASA consider increasing the planned orbital inclination of the Space Station to ease cooperation with the Russian space program. Several other Hartford attendees encouraged NASA to pursue greater cooperation with Russia.

NASA also needs to be much more aggressive in fostering a large community of scientific users for the Space Station, said former NASA science official Frank Lemlay.

A robotic probe to Pluto was cited by several attendees as an important near-term science mission. Frank Boyko of Simsbury suggested that this project would attract such strong public interest that it could be partially paid for by voluntary contributions.

The Hartford town meeting also featured repeated calls for NASA to improve its public affairs activities and television programming. "NASA should do a better job of informing the public about discoveries already made" was a typical comment.

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The meeting ended on a highly philosophical note, as the final audience speaker complained that the agency has not done nearly enough to make human space flight a more routine activity. He warned that another Shuttle accident in the near future could mean the end of NASA.

"We don't have a space program, we have a mission to Earth. We have a great deal of administration, but we don't have any [mission to] space," he said. If the next Shuttle accident leads to 30-month launch hiatus like the Challenger disaster, "NASA won't survive," he said. "If you [instead] bulldoze off the pad and launch six weeks later on schedule, then you are in the space business."

Third Town Meeting

Indianapolis, Indiana
November 29
Indiana University–
Purdue University at Indianapolis

T[illegible]g in Indianapolis [illegible]a decidedly more populist [illegible]n any of the other town [illegible]s, sparked by its unique [illegible] at the Madame Walker [illegible]ife Center just off the cam- [illegible]UPUI. This ornate art deco [illegible] built in 1927 by a self-made African-American female millionaire, was filled by a large, socially diverse crowd eager to pose questions and share opinions.

As with the previous meetings, communication with the public and support for education were cited repeatedly as areas where NASA needs to improve.

For example, attendee Barry Childs-Helton recommended increased support for the NASA arts program as an indirect way to reach people and touch their imagination. Reginald Eggleton of Indianapolis suggested that NASA help organize a "national volunteer affiliate organization," guided by NASA but funded by the local participants.

But many comments in Indianapolis focused on the economic aspects of space activities.

Several people inquired about NASA's hiring forecast and how to become an astronaut. Others urged NASA to become more aggressive in seeking royalties from its technology patents and licenses.

Systems engineer Thomas Nienhaus, from Greenfield, praised the Small Business Innovative Research (SBIR) program for its focus on commercial applications. He suggested that NASA consider increased use of electronic mail and more flexible payment schedules when doing business with small companies, including both advance and progress payments, to help "ease the cash flow crunch a small business may have working under contract."

Physicist William Higgins of Warrenville, Ill., said that NASA must invest more funding in projects with potentially widespread pay-

"My overall response to the town meeting was favorable. It was an excellent forum for interchange between NASA and a broad cross section of people. It provided increased vitality to the cause for science and engineering in Indiana."

Peter Tramm
Indianapolis, Indian

offs, such as advanced technology, utilization of space-based resources like lunar helium-3 and lower-cost space transportation systems. Helium-3 could be used as a power source in nuclear fusion reactors.

Numerous university officials urged NASA to focus more on basic science and less on large hardware-oriented projects like the Space Station. "The immense cost to the taxpayers for building, deploying and operating the Space Station has still not been adequately justified in terms of potential economic and scientific returns," wrote Grant Petty, an assistant professor of atmospheric sciences at Purdue.

Administrator Goldin shares a child's letter with attendees in Indiana.

Another assistant professor at Purdue, Stephen Heister, suggested that funding and personnel resources allocated to the Space Station would be better spent on augmenting the Russian Mir station or building crew-tended laboratories. Heister also was concerned about the lack of investment in advanced transportation technology, such as hybrid rocket engines.

Other audience members cited the National Aerospace Plane (NASP) and single-stage-to-orbit technology as worthy of more aggressive support from NASA. NASP promises airline-type operations from an airbreathing craft that would take-off and land horizontally on a runway, yet be capable of flying fast enough to go directly into Earth orbit; the Department of Defense has been fostering other single-stage technology that would use rocket engines for vertical take-off and landings. Both concepts require significant technology breakthroughs and flight demonstrations before becoming operational.

Human exploration also received vocal support in Indianapolis. "A moonbase is a critical part of an ongoing program," said one speaker. The far side of the moon "really should be explored before we ven-

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ture to Mars!" wrote Alexandra Ackerman of Bloomington.

Mike Seaney of Linton cautioned NASA not to forget the personal and emotional needs of future astronauts. "A Mars crew will need the presence of someone trained in physiology and counseling!" he wrote.

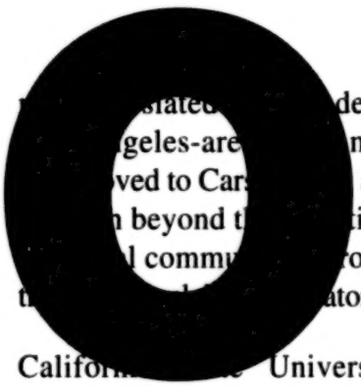
Seventh-grade teacher Bonnie McClain of Yorktown Middle School submitted several comments and questions from her students that attest to interest that exploration generates among students. "If we really have the technology to have people live up in space, why don't we?" wrote Elizabeth Friedle. "When I was younger — about one year ago — I asked my mom something about Mars and she said no one has gone up there," wrote Lonna Nicholson. "I was really surprised. I thought that we would have had the technology."

A separate group of students at the Indianapolis Key School submitted a list of priorities for NASA that included aeronautics research, Shuttle missions, planetary probes and the need to "be as economical as possible so that social problems such as the homeless and the hungry can be better funded."

"The students are disillusioned and dissatisfied with too much talk," especially about the Space Station, said McClain, in a no-nonsense comment typical of the Indianapolis meeting. "Placing belief into action is the true test of the strength of an organization or a nation."

Fourth Town Meeting

Los Angeles/Carson, California
December 3
California State University
Dominguez Hills



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Californ... University at Dominguez Hills (CSUDH) was chosen as the new site due to its culturally diverse student body and the fact that its campus is home to the California Institute of Mathematics and Science, a special accelerated math/science high school. A large number of students from both schools attended portions of the meeting, helping to create an overflow crowd.

The Los Angeles meeting also featured well-received remarks by Yuri Koptev, director of the Russian Space Agency, who was in town touring U.S. aerospace factories. "The fact of this meeting is symbolic of the changes that are taking place in the world today," said Koptev, who reassured the audience that cosmonautics is "alive and well" in Russia. He also called for greater international cooperation in space wherever possible.

The presence of a large, knowledgeable base of aerospace engineers in Southern California, coupled with recent layoffs in the industry, seemed to push the Los Angeles meeting toward discussion of topics like NASA contract management policies and the merits of competing propulsion technologies.

Engineer William Haynes of Rancho Palos Verdes argued that NASA can reduce the unnecessarily high cost of the space systems that it buys only by setting "pure performance specifications," and then letting industry compete to design and operate the systems. Haynes drove his point home by displaying a mountain-climbing carabiner clip he claimed costs less than $20 at a sporting goods store, yet cost NASA more than $1,000 through its space suit contractors.

"The key is to disconnect the user [NASA] from design and operations," he wrote later.

This philosophy was supported by engineer Oliver Harwood of Huntington Beach, who advocated that NASA write even more general specifications than those proposed by Haynes.

Harwood also recommended NASA cancel the Space Station, writing that "it is a real dud, having no growth and no standardization." However, a large majority of the attendees in Los Angeles appeared to support the Space Station as a step toward further human exploration.

Consultant Arthur Schnitt suggested that cost-based criterion should drive the design of most space systems. Vince Wheeler of Los Angeles proposed linking several companies or even unemployed engineers together via computer networks to form "virtual companies" capable of "agile manufacturing."

Several people advocated multi-year funding as the best way to reduce NASA cost overruns. Others simply expressed poignant frustration over the on-going lay-offs in the aerospace industry.

"I am terribly disappointed and bitter about the neglect, vacillation and destruction of the knowledge and experience base of our country's technical people" was a typical comment.

Several speakers in Los Angeles were skeptical of NASA's renewed focus on smaller science missions and technology demonstration satellites.

Nearly 1,000 people attended the Town Meeting at California State University Dominguez Hills.

CSUDH space physics professor Alice Newman said her students are worried that small missions may not return as much unique data as larger satellites. Newman, and her students, also advocated robotic probes over human missions and a reduced emphasis on aviation-related research at NASA.

"One should be very cautious about equating small with cheap," added another speaker, who praised the potential of single-stage-to-orbit propulsion technol-

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"My sister and I are also believers in a balanced environment. We presume that more space exploration, not less, will also benefit all people, improve living conditions and health care around the world, and as more and more industry gears towards new technology, will produce more jobs and better living conditions."

David Lackner
Los Angeles, California

ogy as a way to fly medium- and large-sized payloads at lower cost.

James Sloan of Carson suggested that this technology be operated in tandem with an expendable "Big Dumb Booster" to carry 10,000-pound freight packages to the Space Station.

Other attendees urged NASA to pursue more exotic rocket technology such as rail guns and electric propulsion, while a few other supported nearer-term solutions like an uncrewed version of the Space Shuttle known as Shuttle-C.

Day-to-day experience in Southern California with the unexpected failures that occur during the development of advanced technology appeared to spark several inputs about the need for NASA to speak more openly of the risks associated with its missions.

"The public and Congress must be made aware that 'faster and cheaper' will occasionally result in setbacks," wrote Peter Kahn of Tujunga, who proposed an international Mars mission as the main focus of NASA.

"Trailblazing carries with it [an] inherent risk," wrote Nancy Hayes of Eagle Rock. "NASA should plan now on how to react (publicly) to the next Challenger or Hubble Space Telescope."

The Los Angeles meeting and its related written comments also featured the highest number of vocal proponents for aggressive human exploration of the moon and Mars, with the subsequent goal of eventual human settlement of space.

"The underlying foundation of any activity that we undertake in space must be that humans from Earth will colonize and live permanently off-planet," wrote Hal Horne of Culver City. "Otherwise, we'll just keep crawling back to the cradle. And, who wants to live in a cradle?"

Benigno Muniz, president of the local chapter of the National Space Society, recommended that NASA "concentrate on programs which will lead to sustained exploration, development and settlement of the space frontier in order to avoid the consequences of "°flags and footprints' missions."

"The most popular support comes from the most glamorous missions," wrote Curt Hudelson of Long Beach. In that spirit, several attendees promoted robotic and human missions to Mercury as a more interesting and accessible destination than Mars.

However, a few skeptics like Howard Floyd Stern of Long Beach were firm in their belief that "it will be a century before space infrastructure is adequate to reliably support small colonies at either" the moon or Mars. Stern prefers applied research and devel-

opment, such as Mission to Planet Earth and a solar power satellite prototype.

The proximity of Hollywood, capital of the U.S. entertainment industry, triggered some creative comments on NASA public relations.

"You have got a household name, a pre-sold property," said a man who identified himself as a head writer at an animation studio. "You need to reach kids on Saturday morning TV and through the toy companies."

"I recommend that NASA's logo be on every can, box or product that has evolved from NASA's programs," suggested Suzanne Ridley of Long Beach. "It pays to advertise."

"I am an engineer in charge of post-production at Fox Television dealing exclusively with the promotion of the network," wrote Carolyn Inman Arnold. "NASA needs promotion! Exploration of space is the magic key to getting many different nations united in hope and ideals."

Several people praised the CSUDH meeting but said that it failed in its goal to reach the average citizen with no personal interest in space. "There should be town halls for those who are not involved in the space program," wrote Gene Haberman of Marina Del Rey. "They can be reached through service clubs. These are your customers."

And one emotional speaker in Los Angeles made it clear that NASA still has much more work to do in explaining the social benefits of its programs. Debra Wasserman, a 48-year-old African-American woman who described herself as an ex-homeless person who lives below the poverty line, said she "believes in science. But I have not seen anything in my life that has changed because of NASA — it has no validity to me. I live in areas where you can get shot walking down the street," said Wasserman, now a student at CSUDH. "[The space program] is not real to us."

Fifth Town Meeting

Tampa, Florida
December 11
University of South Florida

[redacted] a few ho[redacted] from Kennedy [redacted]ce Cente[redacted]'s main launch [redacted]n meeting fea-[redacted]hemes. These [redacted]mes inc[redacted]oncerns about [redacted]y space [redacted]ctivities affect [redacted] enviro[redacted]and questions [redacted]ut whet[redacted]ans are mature enough socially to settle in space.

"The [Apollo] moon mission excited everyone — so would a greater focus on improving the Earth's environment," said Christine Logue of Tampa.

"NASA should focus on helping us to learn to live in an ecologically sustainable way on Earth...before we go to other celestial objects and wreck them," said attendee Rob Brister of St. Petersburg, who questioned how much Shuttle launches damage the ozone.

Some see space as the solution. "We are still in a [space] race — a race against time and overpopulation," said architect Merrill Wright. "We must make colonization of space our utmost priority."

Others argued that humanity is not yet mature enough to venture into the solar system permanently. "Exploration is one thing, colonization is something totally different," argued Kenneth Hoyt of Tampa. "Let me state clearly that my preference is for science first, commerce second and social engineering third."

Whether for science or settlement, most people in the Tampa meeting supported an incremental but sustained program of exploration of the moon and Mars, in contrast to the abrupt end of the Apollo program.

"As I grow older, I do not wish to point to a small reddish dot in the sky and tell my grandchildren 'we have been there.' [We do not need] another post card from space," said Robert Rathbone of Tampa. "I wish to someday point up to the heavens...and say 'we are there'."

The NASA vision statement also drew a variety of comments, with most people supporting it but recommending additions. "Exciting short-term goals must be in the vision statement," wrote Ermin Ramiscal of Melbourne.

"Make it clear in your mission statement that there are indeed benefits to the common man that have nothing to do with space exploration," wrote Mike Ellis of Orlando.

"I feel ultimately NASA's vision and purpose should include the search for new life," said George Carr of Melbourne.

Several people advocated a stronger technology research and development angle to NASA's vision. "Our economic, political and social world could never be what it is without the technological advancements which have been accelerated by our national investment in NASA," according to Harold Davis of Brandon. "It is a primary responsibility to include this thought in the NASA statement of mission."

"NASA needs to get back on the cutting edge of technology by doing things that have not been done before," said David Bush-Garcia, a student at the University of South Florida, who added that the general public must be educated to see NASA as "an investment in the future."

Administrator Goldin addresses students at the Tampa Museum of Science and Industry.

Aerospace industry workers who attended the meeting urged NASA to increase its use of off-the-shelf hardware, to write better technical specifications at the start of its programs, and to find new avenues for suggestions from contractor employees "without risk of reprisals" against the worker or their company.

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"As long as there are so many Americans who can't afford health insurance, who don't have a home, who don't have sufficient [food] to eat, I think sinking money in NASA is a crime against the nation."

Dr. Paul Wolbers
Sarasota, Florida

There was slightly mixed support for increasing NASA's role in aeronautics. Some questioned whether this research should be moved to another agency to "clarify" NASA as a purely space-related organization.

But the majority of comments supported aggressive aeronautics research programs like the High Speed Civil Transport. "Making the world a smaller place via more rapid transport will lead to a more unified world to push outward into space," said Michael MacInnes of Tampa.

As with every other town meeting, improved communications with the public and better support for education were cited as key short-term tasks for NASA.

"A lot of Americans feel a great separation between themselves and the space program," said Douglas Edwards. "We need to look into ways to increase its exposure."

Michael Morris of Dunebin, president of a small business, suggested that NASA work to expand its SBIR process to include non-technical projects in public affairs or education. Navy Petty Officer Russell Zimmer suggested a network of NASA Community Centers across the country

Cathy Blair, a teacher at Tampa Palms Elementary School, told the town meeting the issue is not the quality of NASA's educational materials, which she rated an "A+," but rather the lack of publicity about where they can be obtained.

"I wish that there were some more efficient way of alerting teachers to the wealth of information available," especially on Earth science, said Blair, the sister of NASA Shuttle astronaut Sam Durrance.

Susan Pulling of Tampa suggested that NASA help create a course called "Extraterrestrial Science" that could be taught as a fundamental requirement to all middle school students.

Participants in Tampa also repeated the calls at earlier town meetings for greater international cooperation, especially with Russia.

For example, Michael "Lee" Stewart of Tampa proposed a comprehensive organization based on the structure of the United Nations that would be in charge of space traffic control and lunar land grants. NASA would serve as the U.N. agency's primary "administrative and integration contractor," according to Stewart.

Overall, the Tampa meeting featured the most emotional arguments of all the town meetings in favor of NASA as a primary way for the U.S. government to use sci-

ence and technology to benefit peoples' lives.

Administrator Goldin reflected this tone when he closed his portion of the Tampa town meeting by honoring a request by 13-year-old Alicia Cardenas of Naples, Fla., to read her letter at the meeting.

"I wish more people would realize how important space exploration is," Alicia wrote. "My main point is that the Earth isn't going to be around much longer at the rate we're going, and where are we going to live? Space is our only hope and alternative. If we give up on the space program, we're giving up on everything on Earth."

Sixth Town Meeting

Seattle, Washington
December 16
University of Washington

Set on the scenic tree-lined campus of the University of Washington in the waning days of final exams, the Seattle town meeting was in many ways a microcosm of the previous meetings.

Most speakers and written statements expressed concerns about the cost of Space Shuttle operations and the Space Station. Many exhorted NASA to pay more attention to new concepts for space transportation like single-stage-to-orbit technology and rail guns, while others urged greater cooperation with Russia and its fleet of expendable launchers.

A majority of Seattle attendees encouraged an increased emphasis on robotic space missions, with Mission to Planet Earth receiving the most frequent support.

"NASA is an 'Earth' serving organization and should take the great initiative to do planning with all resources available from all spacefaring nations to use these resources in the best means possible to guarantee that our children's children will have a world to grow up in," said one written comment. "NASA should become the organization dedicated to the future of planet Earth."

Others warned that NASA's commitment to building remote-sensing satellites has not yet matched the need for increasing training of Earth science students. "We are not prepared for the enormous [Earth science] data stream that will be descending on us," said Karl Banse, an oceanography professor at the University of Washington. "Must the stars not wait?"

Again, however, a vocal minority stated that Earth science should be done by other government agencies like NOAA. "You are jumping on the environmental bandwagon," said one female speaker. "NASA should be [doing projects that are] outside of the Earth."

As with every other meeting, numerous attendees promoted a vision where NASA's main purpose is to serve as a facilitator for widespread access to space. "NASA needs to open the door for people and industry to get into space" by providing the necessary space transportation infrastructure and technology, said self-described author and astronomer Richard Miles.

"Space should not be a spectator sport for the people of the world," said Robert Taylor, executive director of Washington State Citizens for Space. Taylor urged that NASA's emphasis on technology transfer not overwhelm related efforts to help the private sector develop space.

However, William Smith, director of electric propulsion technology at Rocket Research Corp. in Redmond, said that NASA must pay more attention to focused research and development to help industry. "Market share is the key to the future of NASA," Smith said.

Many attendees in Seattle supported lunar and Mars exploration as the primary focus of NASA. "A definitive plan must be set forth that targets dates for a lunar base and ultimately for a manned mission to Mars," said one anonymous submission. "NASA should return to the epic quest!" said another.

One person quarreled with NASA's plans for the Mars Environmental Survey (MESUR) network. "We need inexpensive missions to Mars," said former Mars Viking team member Jim Tillman. Others cited large space telescopes, such as a lunar interferometer, and near-Earth asteroid detection as projects worthy of greater funding.

Mark Olsoe of Seattle suggested that more aggressive research by NASA into telerobotics could ease the perennial battle between advocates of robotic missions and human space flight. Olsoe envisioned a new class of remote explorer called the "telenaut," who could reconnoiter hostile terrain while sitting safely on Earth.

Several people recommended that space resources be featured more prominently in the NASA vision. "It is hard to imagine a more compelling practical reason for going into space than to procure resources needed for survival on Earth," wrote Loren Steinhauer of Bellevue, citing lunar helium-3 as the "ideal energy source of the future."

Despite the wide influence of the Boeing Co. and its airplane manufacturing subcontractors on the Seattle community, there were few direct comments on NASA's renewed focus on aeronautics.

Vince Creisler of Kent, an airplane mechanic, said the fundamental

"NASA must consider a totally different restatement of its goals and reasons for existence [than the existing vision statement.] I propose that its primary objective should be phrased as 'the preservation and protection of planet Earth as a viable environment for mankind.' It is important to note that NASA's present programs would fit comfortably into this new goal."

Paul Shlichta
Olympia,
Washington

problem at NASA is a lack of strong leadership at the top ranks of the agency and its centers, compared to earlier space visionaries like Wernher von Braun and Sergei Korolev. "Instead of inventing reasons for going into space, they invented the means," Creisler said. "They instinctively knew that as mankind expanded into space that new industries would be born here on Earth and in space."

Some suggested the solution lies in reorganizing NASA, either by transforming the agency's field centers into a group of privately run research centers or by inserting NASA into a new U.S. Department of Science, supported by a "Science and Engineering National Guard" made up of unemployed aerospace workers.

"Why can't NASA let go of total control?" asked Tim Vinopal of Seattle. "NASA is the regulator, operator and builder/integrator. Why can't you contract for manned services and let market-based contractors come up with the best and most economic solutions?"

"I still see the 'Not-Invented-Here' syndrome" in NASA's attitude toward projects like single-stage-to-orbit and the Mars Direct exploration plan, said Frank Luxem of Tacoma.

Within the topic of the need to increase the cultural diversity of the NASA workforce and its contractor team, the Seattle meeting featured the first explicit comment on need for greater awareness of gay rights in the aerospace industry.

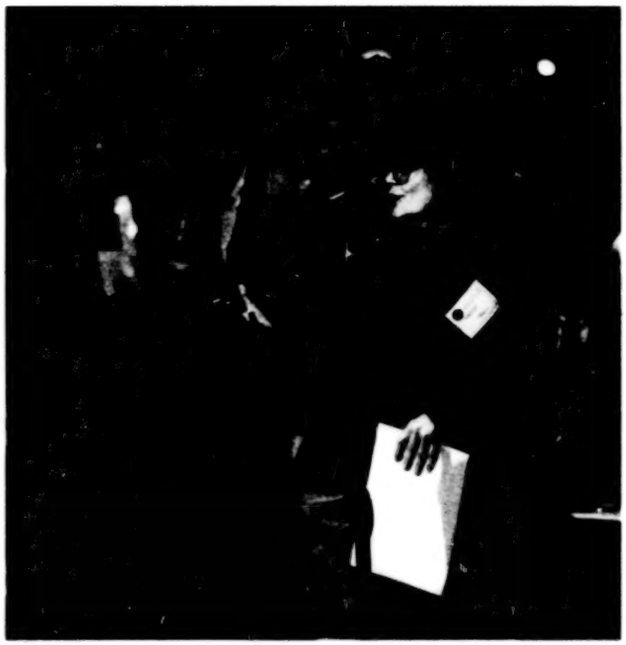
"NASA management needs to set a goal of creating a work environment where no employee will feel threatened by factors in their life that have no bearing on their work," said Joseph Hopkins Jr. of Seattle. "There is a role in space for gays and lesbians."

Many attendees promoted greater use of small businesses in NASA contracting. "They are a model for productivity and quality that the country can use," said speaker Gordon Smith.

Bryce Walden, a researcher with the Oregon Moonbase project, complained that NASA must reduce the paperwork burdens it places on grants and small contracts, and also consider some forms of pre-payment of funding for these groups, to ease their upfront costs.

One anonymous comment urged NASA to combine its new thrusts in small business contracting and Total Quality Management to foster long-term team building between large and small contractors.

William Sweeney of Olympia took teamwork even one step further



Seattle participants came prepared with questions for the NASA panelists

and suggested that NASA do more to recognize informal conglomerates of so-called "micro-businesses." These groups of one- and two-person companies can perform quality work with almost no overhead, he claimed.

This thrust toward diversity also must include greater appreciation for the physically challenged, noted several people scattered throughout the six town meetings.

"I know many children who could be highly motivated to learn and train for a future in space if they believed there would be a possibility of freedom from their disabilities," said teacher Rebecca Copley of Seattle. "Living and working in reduced gravity in space and on the moon could give them this chance."

Again and again, the discussion turned back toward the intertwined topics of public relations and education.

NASA must do more at the elementary and junior high school levels to glamorize math and science, according to University of Washington astronautical engineering professor Adam Bruckner, because "somewhere along the line it becomes uncool to be smart and interested in science and technology." This effort also must try to reach parents and average citizens at home, Bruckner added, in order to have an informed public.

"The public has no clue what the purpose of the Space Station is," wrote John Stevens-Schlick of Seattle. "Please educate us so we can support it."

"NASA has an image problem," said Barron Willis III, a mechanical engineering student at the University of Washington. "It doesn't seem to make the link to the average person."

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Colonel Bolden excites students with stories of space travel.

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Conclusions

NASA learned a great deal from its first town meetings. It was very important to us that we must pursue new and diverse strategic outreach to keep NASA more in touch with the needs and desires of its ultimate customers, the citizens of the United States.

Once the Agency's strategic plan begins to take shape, we hope to return to the road in new regions of the country to double check what we think we heard during the first town meetings and get your opinions about how the plan is shaping up. If a decision is made to hold more town meetings, we will try to vary their size, timing and locations to enable as many people as possible to attend.

Whatever path of future outreach is chosen, we will make extra efforts to reach those people without a predisposed interest or professional stake in NASA.

NASA belongs to you and your future. As we reach for the stars, we will remain fully dedicated to giving you a measurable and inspirational return on your investment.

Administrator Goldin tells students to set their sights high.

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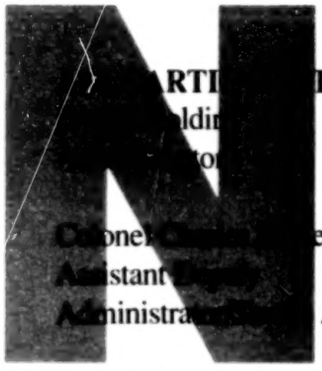
Appendix



PARTICIPANTS
Holding
Not

Colonel Charles Bolden
Assistant Deputy
Administrator/Astronaut

Spence Armstrong
Associate Administrator for Human Resources and Education

Robert Brown
Deputy Associate Administrator for Human Resources and Education

Darleen Druyun
Chief of Staff

Lennard Fisk
Chief Scientist

Wesley Huntress
Acting Associate Administrator for Mission From Planet Earth

Martin Kress
Deputy Space Station Program Manager for Policy and Management

Deidre Lee
Acting Assistant Administrator for Procurement

Frank Owens
Education Division Director

Gregory Reck
Acting Associate Administrator for Advanced Concepts and Technology

Robert Rhome
Microgravity Science Division Director

Cecil Rosen
Acting Associate Administrator for Aeronautics

PREARRANGED LOCAL SPEAKERS

Raleigh

Melissa Brown
Science Teacher
Broughton High School

Dr. Fred DeJarnette
Director
Mars Mission Research Center
North Carolina State University

Chris Jones
Student Body President
North Carolina State University

Larry Sumney
President and CEO
Semiconductor Research Corp.

Hartford

Mary Blain
Physics Teacher
Glastonbury High School

Marilyn Khokahr
Undergraduate Engineering Student
University of Hartford

Dick Hines
Manager
Supersonic Transport Propulsion Program
Pratt & Whitney

Dr. Ladimer Nagurney
Associate Professor of Electrical Engineering
University of Hartford

Indianapolis

Robert Austin
Mechanical Engineering Student
Indiana University-Purdue University at Indianapolis (IUPUI)

Bonnie McClain
Teacher
Yorktown Middle School

Richard Ringoen
Chief Executive Officer (Retired)
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Department of Orthodontics
IUPUI School of Dentistry

Carson/Los Angeles

Raul Alvarado Jr.
Chairman
Society of Hispanic Professional Engineers Foundation and
Senior Staff Specialist
Small Business Office
McDonnell Douglas Space Station Program

Alice Newman
Space Physics Professor
California State University-Dominguez Hills

Justin Reid and
Elizabeth Sanchez
Students
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Tampa

Catherine Blair
Kindergarten Teacher
Tampa Palms Elementary School

David Bush-Garcia

Mechanical Engineering Student
University of South Florida

Dr. Daniel Lim
Department of Biology
University of South Florida

Michael Morris
President
Ocean Optics Inc.

Seattle

Professor Adam Bruckner
Department of Aeronautics and Astronautics
University of Washington

William Smith
Director of Electric Propulsion Technology
Rocket Research Co.

Robert Taylor
Executive Director
Washington State Citizens for Space

Barron Willis III
Mechanical Engineering Student
University of Washington

LOCAL SCHOOL VISITS

Daniels Middle School
Raleigh

Annie Fisher Elementary School
Hartford

Crispus Attucks Junior High School
Indianapolis

Eliot Middle School
and
The California Academy of Mathematics and Science
Los Angeles

Tampa Palms Elementary School
and
The Tampa Museum of Science and Industry
Tampa

Laurelhurst Elementary School
Seattle

INDUSTRY AND COMMUNITY CONTACTS

Raleigh

Research Triangle Institute:
Dr. Al Cruze - Executive Vice President
Dr. Doris Rouse - Director, RTI/NASA Technology Application Team
Jim Clary - Vice President, Electronics and Systems
Dan Winfield - Team Manager, Biomedical Technology Transfer Projects

Business Community:
Tom Davis - Vice President for Economic Development, Durham Chamber of Commerce
T.K. Rao - President, Integrated Laboratory Systems
Dr. Sundar Fleming - Dean, School of Business, North Carolina Central University
Elnora Wilburn - Vice President for Technical Support Services, Research and Evaluation Associates

Hartford

Hamilton Standard:
Robert Kuhn - President
Frederick Morris - Vice President and General Manager, Space and Sea Systems
LTC Jeffrey Parsons - DPRO Commander

Business Community:
Robert Willis - President, Hemco Tool & Die, Inc.
Aziz Elais - President, A.S.E. Precision
Giulia Yacone - President, G.Y. Precision Manufacturing
Jim Ferreira - Manufacturing Representative
Gary Rodriguez - General Manager, C&D Electronics
William Weber - Chief Executive Officer, Tell Tool, Inc.
John Lavieri - President, Sterling Engineering
John Burgess - President, Carleton Technologies, Inc.

Indianapolis

Business Moderation Technology Corp.:
Mike Carter - Quick Train
Wayne Patrick - Partner, Professional Data Dimensions
Roland Dorson - Executive Vice President, Indianapolis Chamber of Commerce
Charlie Garcia - President, Indiana Hispanic Chamber of Commerce
Marsiella Rios-Weible - Treasurer Indiana Hispanic Chamber of Commerce
Jim Shaw - President, Indiana Small Business Development Corp.
Ann Neal-Winston - Director, Indiana Small Business Development Corp.
Elena Looper - Director, Minority Business Development Center
Mike Harrison - Director, Indianapolis Business Development Corp.
Cynthia Myers - Manager, Community Affairs, Indianapolis Chamber of Commerce
Timothy Janis - President, ARAC
Delbert Schuh - President, Indiana Business Modernization & Technology Corp.
Edward Burns - Vice President, Indiana Business Modernization & Technology Corp.
Charles Howard - Manager, Indiana Affiliate Program, Great Lakes Industrial Technology Corp.

Eli Lilly:
Dr. Earl Herr - Executive Vice President, Lilly Research Laboratories
Dr. Noel Jones - Senior Research Scientist
Dr. Roger Harrison - Director, Technology Development and Planning

Los Angeles

Challenger Boys and Girls Club:
Lou Dantzler - Executive Director

Seattle

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